

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 2004/000178

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B02C 23/04, B02C 18/24, F16D 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B02C, F16D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5622034 A (KARL DOMMERT), 22 April 1997 (22.04.1997), column 4, line 60 - column 6, line 48, figure 4, claim 1, abstract --	1-14,16,17, 20,23-30
A	DATABASE WPI Week 198512 Derwent Publications Ltd., London, GB; Class P41, AN 1985-072764 & SU 1080865 A (CONS ROAD EQUIP RES), 23 March 1984 (1984-03-23) figures 1,2, abstract --	1-30

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

4 October 2004

Date of mailing of the international search report

05-10-2004

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 2004/000178

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI Week 197603 Derwent Publications Ltd., London, GB; Class P41, AN 1976-A5939X & SU 462609 A (CONS ROAD ENG RES), 8 July 1975 (1975-07-08) figures 1-3, abstract</p> <p>--</p>	1-30
A	<p>DATABASE WPI Week 200176 Derwent Publications Ltd., London, GB; Class P12, AN 2001-659241 & JP 2001269032 A (SHIKOKU SEISAKUSHO KK), 2 October 2001 (2001-10-02) abstract</p> <p>--</p>	1-30
A	<p>DATABASE WPI Week 199940 Derwent Publications Ltd., London, GB; Class P56, AN 1999-472731 & JP 11 197978 A (ASKA CORP ET AL), 27 July 1999 (1999-07-27), abstract</p> <p>--</p>	1-30
A	<p>GB 238350 A (EDWARD CHARLES ROBERT MARKS), 20 August 1925 (20.08.1925), page 3, line 4 - line 55; page 4, line 47 - line 55, claims 1-39, the figures</p> <p>--</p>	1-30
A	<p>GB 663460 A (THE BRITISH THOMSON-HOUSTON COMPANY LIMITED), 19 December 1951 (19.12.1951), page 4, line 30 - line 51; page 2, line 63 - page 3, line 14, claims 1-5, the figures</p> <p>--</p>	1-30
A	<p>US 2828086 A (H.J. MACEMON), 25 March 1958 (25.03.1958), figures 1-3, claims 1-4</p> <p>-- -----</p>	1-30

INTERNATIONAL SEARCH REPORT

Information on patent family members

03/09/2004

International application No.

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US	5622034	A	22/04/1997	NONE		
GB	238350	A	20/08/1925	NONE		
GB	663460	A	19/12/1951	NONE		
US	2828086	A	25/03/1958	DE	1066135 B	00/00/0000
				GB	813304 A	13/05/1959

PATENT COOPERATION TREATY

PCT

REC'D 31 MAY 2005

WIPO

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference E35252 JFL/J		FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/NO2004/000178	International filing date (day/month/year) 17.06.2004	Priority date (day/month/year) 19.06.2003	
International Patent Classification (IPC) or national classification and IPC B02C 23/04, B02C 18/24, F16D 7/00			
Applicant Tomra Systems ASA et al			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 6 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 19.01.2005	Date of completion of this report 11.05.2005
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Fredrik Andersson / MRO Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NO2004/000178

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1, 3 - 7 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* 2 received by this Authority on 19.01.2005
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* _____ received by this Authority on _____
- pages* 9 - 13 received by this Authority on 19.01.2005
- ☒ the drawings:
- pages 1 - 8 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-23</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-23</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-23</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: US 5622034

D2: SU 1080865

D3: SU 462609

D4: JP 2001269032

D5: JP 11197978

D6: GB 238350

D7: GB 663460

D8: US 2828086

Amended claims have been filed on 19 January 2005, where new independent claim 1 features the old claims 1 and 15, and where new independent claim 14 features old claims 20 and 21. Also, new claims 22 and 23 (originally claims 29 and 30) have been converted to apparatus claims. Further, original claims 2-4, 13, 17 have been deleted.

With regard to the amended claims the cited documents now only represent the general state of the art.

The invention defined in new claims 1-23 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed disintegrator apparatus with power transfer device, and use thereof. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-23 is novel and is considered to involve an inventive step. The invention is industrially applicable.

According to the invention, the disintegrating apparatus mentioned above is characterised, according to the invention, in the features appearing from attached independent claim 1.

Further embodiments of this apparatus are disclosed in sub-claims 2-13, 22 and 23.

5

The power transmission apparatus is characterised, according to the invention, in the features appearing from attached independent claim 14.

Further embodiments of the power transmission apparatus are disclosed in sub-claims 15 - 23.

10

The invention will now be described in the form of an example with reference to the attached drawings.

Figures 1 and 2 show the disintegrating apparatus seen from different sides and from above with a chamber cover removed to reveal details of the apparatus.

15

Figure 3 shows the apparatus in Figure 2 from below.

Figures 4, 5 and 6 are exploded drawings of that shown in Figures 1, 2 and 3 respectively.

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Figure 7 shows a variant of a knife unit as shown in Figures 1-6.

Figures 8, 9, 10 and 11 are respectively a top view, a sectional view, an end view and a side view of the knife unit shown in Figure 7.

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A M E N D E D P a t e n t c l a i m s

1.

An apparatus for disintegrating degradable or non-degradable material, wherein the
5 apparatus has a functional unit in the form of a rotatable knife unit driven by a motor (2)
via a mechanical power transmission device (7) which comprises as part thereof a
flywheel (8),

characterised in

- that the functional unit has knife blade (51) which on rotation in a chamber (4) is
10 designed to move along a chamber wall, wherein at least a part of the wall has
perforations;

- that the mechanical power transmission device (7) comprises a mechanism in
the form of a clutch (9) which provides sudden power engagement with coupling
device (10) and thence with the knife unit (1) , said mechanism comprising one
15 or more movable engagement blocks which are mounted on a guide device (28',
28", 29', 29", 32, 33) and designed, through centrifugal force during increasing
rotation of the flywheel (8), to move radially outwards either gradually or
suddenly, and at a predetermined rotational speed, to engage with engagement
means, e.g., a block or blocks on a rotating part (37) of the coupling device, e.g.,
20 a rotating plate, which forms a further connection to the functional unit.

2.

An apparatus as disclosed in claim 1, characterised in

25 - that the mechanism is designed to be deactivated either by reversing the normal
rotational direction of the motor, or on cessation of the rotation of the flywheel,
or in that the rotational speed of the flywheel is below a predetermined
disengagement threshold.

30 3.

An apparatus as disclosed in claim 1 or 2, characterised in

- that the engagement time of the mechanism as a function of the rotational speed
of the flywheel is adjustable.

35 4

An apparatus as disclosed in claim 1, 2 or 3, characterised in

- that the coupling device consists of an adjustable slip coupling.

19-01-2005

10

5.

An apparatus as disclosed in one or more of claims 1 - 4, characterised in

- that the mechanism is designed, when a certain rotational speed of the flywheel has been reached, to cause a sudden engagement between the flywheel and the further mechanical transmission to the functional unit via the coupling device.

6.

An apparatus as disclosed in one or more of the preceding claims, characterised in

- that the rotational energy of the functional unit alone accounts for 2-50% of the total rotational energy represented by the motor, the power transmission device including the flywheel, and the knife unit.

7.

An apparatus as disclosed in one or more of the preceding claims, characterised in

- that said knife blade forms an angle with the rotational axis of the functional unit.

8.

An apparatus as disclosed in one or more of the preceding claims, characterised in

- that said knife blade is replaceable and/or adjustable.

9.

An apparatus as disclosed in one or more of the preceding claims, characterised in

- that the functional unit consists of a hub from which arms project, which at their outer end form a mount for said knife blade, and
- that the hub and the arms are moulded in a single piece of a lightweight material, e.g., aluminium or reinforced plastic

10.

An apparatus as disclosed in one or more of claims 1 - 8, characterised in

- that the functional unit consists of a hub from which arms project, which at their outer end form a mount for said knife blade, and
- that the hub and the arms are formed of two moulded, identical, joinable parts of a lightweight material, e.g., aluminium or reinforced plastic.

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11.

An apparatus as disclosed in one or more of the preceding claims,
characterised in

- that said knife blade is designed on rotation along the chamber wall to move past
5 at least one counter-knife (54) mounted on the chamber wall, and
- that the position of the counter-knife is adjustable.

12.

10 An apparatus as disclosed in claim 1, wherein at least one pair of blocks is used,
characterised in

- that the guide device consists of an articulated arm device common to the pair of
blocks whose articulated arms are pivotally fastened to the flywheel.

15

13.

An apparatus as disclosed in claim 1, characterised in

- that there is provided at least one pair of diametrically arranged engagement
blocks.

20

14.

An apparatus for the transmission of power from a motor (2) to a functional unit (1) via
a flywheel (8) which forms a part of a power transmission device (7), characterised in

- that the transmission device (7) comprises as part thereof a mechanism (9) in the
25 form of a clutch (9) which has means for sudden power engagement with a
coupling device (10), and wherein the clutch mechanism (9) forms further
connection with the functional unit;
- that said mechanism (9) consists of one or more movable engagement blocks
(28, 29), which are mounted on a guide device (28', 28'', 29', 29'', 32, 33),
- 30 - that power transmission to the functional unit (1, 4) is designed to take place
when the rotational speed of the flywheel (8) passes a defined threshold value;
and
- that the block or blocks are designed, through centrifugal force during the
increasing rotational speed of the flywheel, to move radially outwards either
35 gradually or suddenly, and at a predetermined rotational speed, to engage with
engagement means (37', 37''), e.g., a block or blocks on a rotating part (37) of the
coupling device (10), e.g., a rotating plate, which is a part of the power

transmission device (7) and which forms further connection to the functional unit (1).

5 15.

An apparatus as disclosed in claim 14, characterised in

- that said mechanism is deactivatable either by reversing the normal rotational direction of the motor, or on cessation of the rotation of the flywheel, or in that the rotational speed of the flywheel is below a predetermined threshold value.

10

16.

An apparatus as disclosed in claim 14 or 15, characterised in

- that time-to-engagement of the mechanism is adjustable as a function of the rotational speed of the flywheel.

15

17.

An apparatus as disclosed in claim 14, wherein at least one pair of blocks is used, characterised in

- 20 - that the guide device consists of an articulated arm device common to the pair of blocks whose articulated arms are pivotally connected to the flywheel.

18.

An apparatus as disclosed in claim 14, characterised in

- 25 - that there is provided at least one pair of diametrically arranged engagement blocks.

19.

An apparatus as disclosed in one or more of claims 14 - 18, characterised in

- 30 - that the coupling device comprises an adjustable slip coupling.

20.

An apparatus as disclosed in one or more of claims 14 - 19, characterised in

- 35 - that the mechanical transmission engagement or disengagement of the flywheel is centrifugal force based.

21.

An apparatus as disclosed in one or more of claims 14 - 20, characterised in

- that the power transmission device is designed, in the event of a predetermined working resistance being exceeded, to cause at least partial deactivation of said mechanism for disconnection of power transmission from the device to the functional unit;
- that said deactivation involves the flywheel with its rotational energy being mechanically disconnected from the coupling device; and
- that said disconnection of the rotational energy of the flywheel is centrifugal force controlled.

22.

An apparatus as disclosed in one or more of claims 1-21, characterised in

- that the functional unit is designed and dimensioned to disintegrate or compact articles selected from the group consisting of:
 - a) articles in the form of packaging, for example, bottles, cans, beverage cartons, trays or boxes, and accessories for same;
 - b) articles made of plastics material, glass, light metal or thin metal, e.g., tin;
 - c) articles of biologically degradable material, for instance, wood, plants, plant debris, paperboard, starch-based material and cellulose-based material;
 - d) packaging of biologically degradable material selected from paperboard, starch-based material and cellulose-based material.

23.

An apparatus as disclosed in claim 22, characterised in that the apparatus is designed and dimensioned for handling or processing articles selected from group a) in a reverse vending machine.